

## A PHOTOGRAPHIC RECORD OF A PRE- AND POST-LAKE CREATION EVENT FROM WORLD WAR II AT VALLEY, ISLE OF ANGLESEY, UK

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### Introduction

It was 1939, war had just been declared and military preparations were underway. A strategic series of airfields was required throughout Britain. Locations in north-west Wales were limited due to the mountainous nature of the topography. It is not surprising that the lowlands of the Isle of Anglesey were subject to a systematic survey. At first it was reported that the majority of the areas examined were unsuitable due to the contours of the land (Sloan 1995).

Tywyn Trewan, an area of coastal sand dunes between the villages of Valley and Rhosneigr, was mentioned as a possibility but the cost of preparation would be high. Llyn Dinam, Llyn Penrhyn and some smaller water bodies, inter-connected by marshes and small streams, lay within this area. In 1940 German aircraft started to attack Merseyside by approaching from the west, having flown from bases in northern France, over St. George's Channel and up the Irish Sea. This development made an airfield in north-west Wales essential to provide a base for fighters to intercept attacking aircraft. It would also provide protection for shipping in the Irish Sea (Sloan 1995).

The construction of three runways in a triangular pattern began with the levelling of the sand dunes of Tywyn Trewan (Sloan 1995). This activity did not go unnoticed by German surveillance. A series of aerial photographs dating from November 1940 to January 1941 bears witness to regular flights across Anglesey by the Luftwaffe. The main targets for surveillance appear to have been Holyhead harbour, with large ships clearly visible, the rapidly developing airfield at Valley, Ty Croes army camp and the bridges over the Menai Strait, which would have been of strategic importance.

Over the months an airfield took shape at Valley (Fig. 1a): on 16 November 1940 three runways are visible as strips of bare sand on these

photos, with only limited disturbed areas beyond them. No signs of buildings are evident. By 23 December 1940 two of the three runways are dark in colour and have obviously been surfaced. A network of tracks at the landward end of the runways and what appear to be low huts have also sprung up in just 5 weeks. The area of bare sand has now extended well beyond the runways almost to the beach and one can imagine that the base was already a very sandy place to live and work.

Unfortunately the negatives of these prints were lost, perhaps during allied bombing raids. However the prints survived, seized by allied forces at the end of the War as a valuable source of information. Today they form part of a major Luftwaffe collection stored in the National Archive and Records Centre, Maryland, USA. Additional information on the origin, technical specifications and the logistic effort required to obtain these photographs can be found in Robins (1993).

As the cover of Marram grass (*Ammophila arenaria*) was lost during the airfield construction, wind-blown sand became a big problem. Sloan (1995) describes how sea-breezes drove it into everything from workmen's lunch boxes to aircraft engines. In May 1942, a week after taking up his post, Royal Air Force (RAF) Wing Commander W. Churchill wrote " ...had a busy week at Valley making detailed inspections of the camp and formulating schemes to combat the biggest enemy -SAND-" Unsuccessful attempts were made to stabilise the sand by seeding with grass. Then it was decided to dredge silt from the nearby lakes and spread it over the airfield and this proved to be an effective solution to the sand problem. In the process, the spectacular archaeological find at Llyn Cerrig Bach was made (Lynch 1991), alterations to the drainage system were carried out and a number of new basins were excavated in marshy areas.

### **The photographic record**

By comparing a recent aerial photograph of the Valley area (Fig. 1b; taken in 1993) with a German surveillance photograph from 1941 (Fig. 1a), it is possible to infer the environmental changes made to this sand dune and lake system as a direct consequence of constructing the airfield. Large areas of white bare sand are clearly visible adjacent to the new runways (Fig. 1a), which sloped to single drains along one side (Sloan 1995). Part of Tywyn Trewan, the extensive sand dune system, was completely destroyed to create the runways and the technical and domestic accommodation.



FIG. 1. Aerial photographs of RAF Valley Airforce base.

(a) (*above*): Luftwaffe photograph of airforce base under construction, 1941. Llyn Penrhyn is the only major lake visible but the south-west end of Llyn Dinam and the associated drainage channel is visible immediately above.

(b) (*left*): The airforce base in 1993. Arrows indicate excavated lake basins.

Llyn Treflesg was the largest area of standing water created by the dredging. It was excavated along the drainage channel, which ran from Llyn Dinam towards the railway line. The platforms used to support the draglines employed in this operation are still visible along the shoreline today. Nets were dragged through the peat, the material collected was stored for a few days to drain and then spread over the sand with harrows (Lynch 1991). A cluster of small lakes was excavated between the rocky outcrops on either side of the railway line. The two largest of these lakes were excavated along the drainage channel, which arose from Llyn Dinaffi. The environmental cost of this new lake creation would have been habitat loss of another kind. The excavated areas would not have been agriculturally improved and were probably marshy grassland or swamp. Dredging of Llyn Penrhyn may also have taken place but no specific reference to this action was found. However, this could account for some of the difficulties encountered when an attempt was made to carry out a quantitative reconstruction of total phosphorus concentrations based on diatom assemblages in a core of sediment from Llyn Penrhyn (Bennion et al. 1996).

The first occupants of RAF Valley were a flight of 312 (Czech) Squadron's Hurricanes on 3rd March 1941 (Sloane 1995) but they were followed by an international range of fighter units as the war progressed. The crews were probably accommodated in some of the simple buildings discernible in Fig. 1a. Although the original field pattern is still discernible, especially around Llyn Penrhyn, in the photograph from 1993 (Fig. 1b), there has been a dramatic increase in the number of buildings. By the end of 1943, Valley was no longer used as a fighter station but it went on to act as a vital reception and withdrawal centre for American heavy bombers (Sloan 1995). After the war, the base became a flying school and it remains an important training centre for the RAF. The base was enlarged ca. 1956 and it currently employs about 1000 people and covers 50% of the Penrhyn catchment (Haworth et al. 1996). The comparison of these Anglesey aerial images provides a semi-quantitative estimate of the amount of new habitat creation at a specific site. At Valley, six new water bodies with a combined surface area of approximately 6 ha were created. Finally, it is tempting to conclude that there has been an increase in scrub and wetland habitat adjacent to Llyn Penrhyn since the end of the War. This impression could be caused by the differences in photographic quality of the images but it could also result from the recent management of this site as a nature reserve or vegetation succession. Today Llyn Penrhyn and Llyn Dinam and the associated smaller water bodies lie within the Llynau y Fali: Valley Lakes Site of Special Scientific Interest (Duigan et al. 1996). Llyn Penrhyn is also part of a Royal Society for the Protection of Birds Reserve.

## Discussion

The war-time photograph of Valley is clearly coincident with airfield construction, with the large areas of bare sand compatible with the contemporary reports of problems associated with wind borne sand. Haworth et al. (1996) described the lake sediment from Penrhyn and two other Anglesey lakes as "*Limnus detrituosus* and *siliceus organogenes*", after Troels-Smith (1955). Diatom remains were very rare or absent in the basal half of a short core (70 cm) examined. They became more frequent above 30 cm (mid to late 1800s). Haworth et al. (1996) proposed that the scarcity of diatoms in the lower parts of the core was the result of wind blown sand and this is consistent with the presence of a large and dynamic sand dune system before the construction of the airfield (Fig. 1a). The abundance of sand grains in the prepared diatom slides and the lack of  $^{210}\text{Pb}$  in the samples below 24 cm also indicated a high level of minerogenic input. Haworth et al. (1996) suggested that the diatom increase in Penrhyn seemed to post-date the building of the railway embankment in the 1840s, which may have had a stabilising and sheltering effect preventing the movement of sand to the lake basin. The influence of the railway embankment seems to have persisted through the airfield development period with no discernible increase in minerogenic material in the lake sediments of this period. The microfossil and palaeopigment analyses of the lake sediments (Haworth et al. 1996) suggested that significant enrichment had occurred by the 1970s and it was continuing in the form of sewerage effluent input from the airforce base. These two photographs provide a strong visual impression of the scale of infrastructure and building development since World War II.

Photography is being used with increasing frequency as a means of monitoring freshwater habitat change. Maitland (1996) demonstrated how sampling site photographs could be used as a means of habitat monitoring. The observations made on seasonal vegetation change and favourable weather conditions are equally applicable for aerial photographs. Aerial photographs are routinely used to document river channel movement and morphological changes (e.g. Lyons et al. 1992; Gurnell 1997) and other forms of wetland habitat disturbance and change (e.g. Kowalski & Wilcox 1999; Rice et al. 2000). The Luftwaffe photograph archive has been used to trace the historic development of British cities (e.g. Robins 1993). There is every possibility that the unique German military photographic record illustrated in this paper will reveal additional scenarios of environmental change for freshwater and terrestrial habitats in other strategic locations in Europe.

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